REMARKS

I. Introduction

Claims 14-33 are pending in the application. Claims 1-13 have been canceled. Claims 14-18 have been allowed. Claims 23-24 and 30 have been objected to, but deemed allowable if rewritten in independent form. Claims 19 and 29 have been amended to note the tonneau cover includes thermoplastic panels. Support for amended claims 19 and 29 may be found in the specification at page 6, paragraph 23.

The Examiner has rejected claims 19-22, 25-29, and 31-33 based on 35 U.S.C. § 102(e) and has rejected claims 26-28 and 31-32 under 35 U.S.C. § 103(a) for the reasons mentioned below.

Applicants traverse the Examiner's rejections based on 35 U.S.C. §§ 102(e) and 103(a) and the arguments in support thereof, and request reconsideration and withdrawal of the rejection.

II. Claim Rejections Under 35 U.S.C. § 102(e)

The Examiner has rejected claims 19-22, 25, 29, and 33 under 35 U.S.C. § 102(e) as being anticipated by Fujimoto (U.S. Patent Application Publication No. US 2004/0021342 A1). The Examiner has alleged that the panel taught by Fujimoto anticipates the panel of the instant invention because the panel of Fujimoto allegedly covers a tonneau as broadly recited.

Applicants respectfully traverse this rejection and submit that Fujimoto does not anticipate all of the elements of the claimed invention. In order to reject a claim under 35 U.S.C. § 102, the Examiner must demonstrate that each and every claim element is contained in a single prior art reference. *See* M.P.E.P. § 2131 (August 2004). Claim terms are to be given their plain meaning as understood by the person of ordinary skill in the art, particularly given the limitations of the English language. *See* M.P.E.P §§ 707.07(g); 2111.01 (August 2004). Not only must the claim terms, as reasonably interpreted, be present, an allegedly anticipatory reference must enable the person of ordinary skill to practice the invention as claimed. Otherwise, the invention cannot be said to have been already within the public's possession, which is required for anticipation.

The paneled hood disclosed by Fujimoto does not anticipate the invention of claims 19-22, 25, 29, and 33 because the panel is made of a metal alloy (claim 4; paragraphs 1, 97, 146, 147, and 149). Fujimoto does not disclose the use of thermoplastic panels. In contrast, Applicants' amended claims 19 and 29 and then dependent claims recite a composite panel comprising a moldable thermoplastic panel for a tonneau cover that is lighter weight and more easily liftable and removable, compared to metal. The thermoplastic material used in Applicants' invention as in claims 19 and 29 "may be high density polyethylene (HDPE), thermoplastic olefin (TPO) or other suitable rugged and dimensionally stable thermoplastic material." (page 6, paragraph 23 of the specification).

The panel taught by Fujimoto would also not anticipate a tonneau cover as claimed in claims 25 and 33 because it well known in the art that a tonneau cover is a cover for a rear compartment of an automobile.[1] It is well known in the art that a car hood refers to a part of the front of an automobile, not the rear or trunk of an automobile. The panel taught in Fujimoto is used as a car hood panel (paragraph 16). One of ordinary skill in the art would understand that the potential impact taught by Fujimoto refers to potential collisions between the front hood of a car and pedestrians while a car is moving forward (paragraph 125). Indeed, the car hood panel taught in Fujimoto was designed specifically to protect pedestrians upon potential impact with a hood of a car, i.e., the front of the car, as opposed to the rear (Figure 9a; paragraph 27, "... along the border line from the ground surface at the car body front to the hood impact position"). In light of the above-mentioned arguments, Applicants respectfully submit that claims 19-22, 25, 29, and 33 are patentable in view of the prior art, and Applicants request that the Examiner withdraw this rejection in light of these arguments.

III. Claim Rejections Under 35 U.S.C. § 103(a)

The Examiner has rejected claims 26-28 and 31-32 under 35 U.S.C. § 103(a) as being unpatentable over Fujimoto (U.S. Patent Application Publication No. US 2004/0021342 A1). The Examiner has alleged that Fujimoto discloses the claimed invention except for the use of reinforced plastic materials instead of a metal. The Examiner has alleged that § 2144.07 of the M.P.E.P. sets forth that the selection of a known material based on its suitability for its intended purpose supports a case of *prima facie* obviousness, and that it would have been obvious to one

[1] http://dictionary.reference.com/search?q=tonneau.

of ordinary skill in the art at the time of the invention to construct the metal panel of Fujimoto using a well-known plastic or reinforced plastic material instead of metal because such plastic weighs less than metal and can be suitably strong for such a use.

Applicants respectfully traverse this rejection. There are three requirements that must be met in order to establish a *prima facie* case of obviousness under 35 U.S.C. § 103. First, there must be some suggestion or motivation in the prior art to modify the reference. Second, the modification must suggest a reasonable expectation of success of producing the claimed invention. Finally, the prior art reference, when modified, must teach or suggest all elements of the claim. The teaching or suggestion to make the claimed modification and the reasonable expectation of success must both be found in the prior art, and not based on the Applicants' disclosure. *See* M.P.E.P. §§ 2142-43 (August 2004). Any rejection based on assertions that a fact is well-known or is common knowledge in the art without documentary evidence to support the Examiner's conclusion should be judiciously applied. M.P.E.P. § 2144.03 (August 2004).

Applicants respectfully submit that one of ordinary skill in the art would not have been motivated to substitute a plastic material for the metal car hood panel taught in Fujimoto. The Examiner cites *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (C.C.P.A. 1960) to support the argument that it would be obvious to substitute the metal used in Fujimoto with a known plastic. However, *In re Leshin* was cited in the M.P.E.P. for the proposition that selection of a known plastic to make a container would be obvious where the container was already made of a different type of plastic prior to the potential substitution. In Fujimoto, the panel is made of a metal. Therefore, *In re Leshin* would not support the Examiner's contention because in view of *In re Leshin*, one of ordinary skill in the art would have been more likely to substitute the metal of Fujimoto with a different type of metal rather than a thermoplastic. *See* M.P.E.P. § 2144.07 (*citing In re Leshin*, 227 F.2d 197, 125 USPQ 416 (C.C.P.A. 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious)).

Furthermore, one of ordinary skill in the art at the time of the invention would not have been motivated to modify Fujimoto to produce a reinforced plastic panel instead of a metal panel because the metal body hood panel structure of Fujimoto "excels in the head impact resistance for protecting a pedestrian and is made of a metal material such as aluminum alloy, steel excellent in the bending rigidity" (paragraph 1). This excellence in bending rigidity of the hood

is due to the *increased* bending rigidity of metal, which enables Fujimoto's hood to be flexible enough to bend upon impact in order to protect pedestrians in case of a collision (paragraph 127). Although plastic does weigh less than steel, reinforced plastic is known to one of ordinary skill in the art to generally have a *lower* bending rigidity. (*See* enclosed copy of 3R International 40 (2001) Special Plastic Pipes, pp. 46-47). In contrast, Fujimoto teaches the desirability of using metals, such as aluminum alloy and steel, in the car hood panels because in addition to being light-weight (relatively speaking for a car hood as opposed to a tonneau cover), economical and suitable in the case of potential head impacts of adult and children pedestrians, the steel material that the outer part of the hood is made of has a high bending rigidity (paragraphs 7, 47, 60, and 145). Fujimoto is primarily directed to providing a hood panel that is ideal for head impact resistance in pedestrian protection. The use of metal in Fujimoto's hood panel greatly contributes to the suitability of the hood panel for handling potential pedestrian impact. Therefore, it would be unlikely that one of ordinary skill would be motivated, based on Fujimoto's teaching that metal is important to achieve the desired properties, to replace the metal hood of Fujimoto with plastic because this would detract from the focus and primary purpose of Fujimoto. Instead Fujimoto teaches away from such substitution by recommending metals and alloys desired to achieve the stated projection.

Furthermore, one of ordinary skill in the art at the time of the invention would not have been motivated to replace the steel of the claimed invention with reinforced plastic because the claimed invention is directed to car hood panels, not tonneaus for the rear of an automobile, as mentioned above. Such covers should be flexible and much lighter in weight for easy liftability and removeability by the car owner, since a tonneau must be lifted or removed to provide items to the rear of the vehicle.

In light of the above-mentioned arguments, Applicants respectfully submit that claims 26-28 and 31-32 are patentable in view of the prior art, and Applicants request that the Examiner withdraw this rejection in light of these arguments.

IV. Claim Objections

The Examiner has objected to claims 23, 24, and 30 for being dependent on a rejected base claim, but the Examiner has alleged that the claims would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

Applicants respectfully submit that if an independent claim is nonobvious under 35 U.S.C. 103(a), then any claim depending therefrom is also nonobvious. *In re Fine*, 837 F.2d 1072, 5 USPQ2d 1596 (Fed. Cir. 1988). Thus, Applicants submit that because claims 19 and 29 are nonobvious in view of the prior art for the above-mentioned reasons, all dependent claims therefrom would also be nonobvious.

V. Conclusion

In view of the foregoing, Applicants submit that claims 19-33 are patentable over the references cited by the Examiner in support of rejection. Withdrawal of the rejection and a Notice of Allowance are respectfully requested.

Respectfully submitted,

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LLC:TLC
Enclosures: Petition for Extension of Time of three months; two references

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ton·neau Pronunciation Key (tə-nō', tŏn'ō)
n. pl. **ton·neaus**

The rear seating compartment of an early type of automobile.

[French, from Old French `tonnel`, *cask.* See **tunnel.**]

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Reinforced Thermoplastic Pipes (RTP)

State of Development, Situation on the World Market and System Introduction in Germany

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Design and Function of Aramid-Reinforced Plastic Pipes

The use of high-performance glass, carbon or aramid fibres for reinforcing plastics also opens up new possibilities for pipeline construction. Glass-fibre-reinforced plastic pipes have been used for handling highly corrosive fluids in chemical plants for many years. Reinforced plastic pipes are also used as flexible risers when producing natural gas and oil from deep sea fields. In each case, products are individually tailored to meet the specific requirements of the application. Pipes with a large number of different layers are produced by wrapping processes. For example, reinforcing layers made from a number of different steel profiles may be wrapped around an inner plastic pipe. Thin plastic layers are applied between these reinforcing layers to ensure inner and outer sealing and to provide separation. The wrapping angle of each reinforcing layer is selected to withstand internal or external pressure or longitudinal stress.

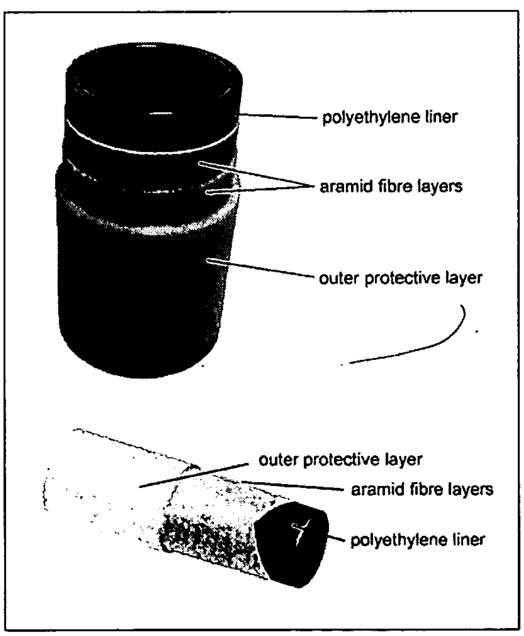

Fig. 1: Schematic Structure of an Aramid-Reinforced Plastic Pipe

Reinforced Thermoplastic Pipes have been developed to meet the very specific requirements of handling corrosive fluids such as crude oil and sour gas at pressures up to 100 bar. These pipes consist of three layers. The inside layer is a conventional polyethylene pipe surrounded by aramid fibres applied in a criss-cross configuration to withstand stress. These reinforcing aramid fibres are in turn surrounded by an outer polyethylene coating (**Figure 1**). In the composite structure of the fibre-reinforced plastic pipe, each of the layers has a different function to perform. The polyethylene inner pipe supports the aramid fibre layers and provides the rigidity required to withstand external stress caused by earth or traffic loads. It also seals the fluid carried by the pipe off from its surroundings. The support provided by the inner pipe is absolutely essential as the fibres can only absorb longitudinal stress. The aramid fibres constitute the main structural element of the pipe, absorbing the stress caused by internal pressure, and are wrapped around the inner pipe in several layers in alternating directions. The number of individual aramid fibre layers required depends on the internal pressure in each case. The wrapping angle of the aramid fibres with reference to the pipe centreline is about ±55°. The outer layer which is applied to the aramid fibres provides mechanical protection against damage.

Like glass and carbon fibres, aramid fibres are high-performance fibres. Aramid is a synthetic organic polymer (an aromatic polyamide) produced by a spinning process. Following spinning, the fibres are heated and stretched to obtain espe-

cially high strength. The tensile strength of aramid fibres is about 2,700 N/mm², with an elongation at rupture of 3.3 %. Aramid fibres demonstrate excellent resistance to organic substances such as alcohol, petrol and various types of oil. However, aramid fibres are destroyed by hot, concentrated acids and bases such as sulphuric acid or sodium hydroxide. Gases such as CO_2 or CH_4 have no effect on the strength of aramid fibres.

Market Overview

Aramid-reinforced plastic pipes are currently available from four manufacturers. The standard product range includes nominal diameters from DN 50 to DN 250 and the maximum operating pressure is between about 35 and 100 bar, depending on the number of layers of aramid fibres and the pipe diameter. These values apply to a maximum operating temperature of 65 °C and a service life of 50 years. At lower temperatures, the service life is extended. Apart from the product range, the main differences between the individual manufacturers concern the pipe production process and the type of couplers used. Two types of couplers are currently available:

- ▷ compression fittings and
- ▷ welded couplers.

With compression fittings (**Figure 2**), internal and external metal ferrules are pushed onto the end of the pipe followed by plastic deformation to ensure a force fit between the pipe and the ferrules. The shape of the aramid-reinforced pipe is especially designed to ensure good transmission of forces. The fitting can also be welded to other plant components or connected by installing a flange.

Figure 3 shows a welded joint. The first step is to join the internal polyethylene liner by a conventional butt weld. A reinforced thermoplastic sleeve, which is slid onto the pipe prior to butt welding, is then positioned over the joint and welded to the outer polyethylene layer using copper heating coils integrated in the sleeve. Together with the outer polyethylene layer, this sleeve absorbs and transmits longitudinal forces. Whichever coupler system is used, it is important to remember that full transmission of longitudinal forces is only ensured when the pipe is exposed to internal pressure.

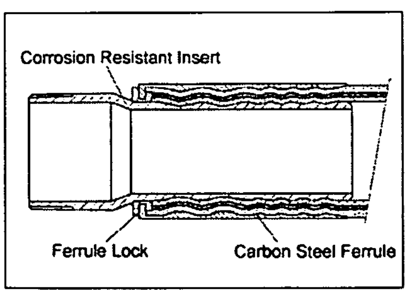

Fig. 2: Compression-Type End Fitting

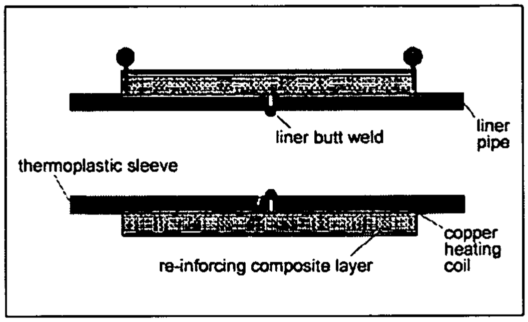

Fig. 3: Welded Joint

Possible Applications

It is currently normal practice to use steel pipes for gas transmission pipelines. On the other hand, most gas distribution systems for pressures up to 4 bar are constructed using polyethylene pipes. Polyethylene pipes are also available for the pressure range from 4 bar to 10 bar, but they have not secured a significant market share in this sector. The advantages of plastic pipes, compared with steel pipes, are as follows:

- ▷ highly flexible material,
- ▷ lower weight compared with steel,
- ▷ easy to weld using standardized automatic welding machines,
- ▷ no possibility of corrosion,
- ▷ improved service life of newly developed materials.

As a result of these advantages, plastic pipes have superseded steel in the pressure range up to 4 bar. DVGW[1] statistics confirm this development and accident and incident figures also show that the pipes meet all the safety requirements posed in this application if they are properly laid. On the other hand, plastic will only be successful in gas transmission system if high-strength plastic pipes are available. The aramid-reinforced plastic pipes available on the European market offer an alternative in this area. Because of their many advantages, aramid-reinforced pipes are already used as an alternative to steel pipes for oil pipelines In the Middle East. Aramid-reinforced plastic pipes are immune to the corrosion problems which plague steel pipes. Because of their low weight and rigidity, they are also very easy to lay. Normal pipeline construction methods, involving trench excavation, stringing of pipes, tying-in, lowering-in and backfilling can be used. Apart from these conventional methods, aramid-reinforced plastic pipes can also be installed by trenchless pipelaying technologies using wheel ditchers or ploughs (**Figure 4**). Road, rail and water crossings can be installed by controlled horizontal drilling methods. Heavy construction equipment, such as the sidebooms required for steel pipeline construction, is not needed. The low bending rigidity of the pipe material means that changes of direction can be accomplished easily by elastic bending. The pipes may be connected to other plant components using the end fittings available, which are equipped with conventional flanges or welding ends. However, as the strength properties of the material are temperature-dependent, the appropriate minimum bending radius determined by the working temperature must be observed. As with conventional polyethylene pipes, these pipes should only be laid at temperatures above 0 °C.

Because of their low bending rigidity, aramid-reinforced pipes are also suitable for use as liners in existing pipes. Conventional polyethylene pipes are already inserted as liners for the rehabilitation of gas and water distribution lines. In the spring of 2000, initial pilot tests were conducted for the use of aramid-reinforced plastic pipes in a pipe-in-pipe system for the handling of non-dried natural gas containing hydrogen sulphide. An aramid-reinforced plastic pipe (DN 75,

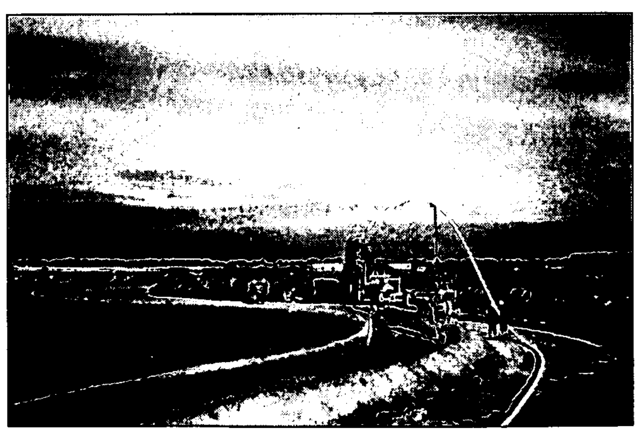

Fig. 4: Laying Aramid-Reinforced Plastic Pipes

[1] Deutsche Vereinigung des Gas- und Wasserfaches, Bonn (GER)

PN 100) was inserted into a steel pipeline (DN 150, PN 100) with a total length of 900 m [6].

Following insertion, an annular space remains between the aramid-reinforced liner and the original line pipe. As a result of this restriction of the pipeline cross section, the carrying capacity of the pipeline is reduced if the pressure rating remains unchanged. However, because of the high pressure rating of aramid-reinforced plastic pipes, it may even be possible to increase the carrying capacity of the rehabilitated pipeline section in individual cases. Whatever rehabilitation method is used, the existing pipeline must first be cleaned and inspected to identify any obstacles that could result in damage to the liner during insertion or operation. Aramid-reinforced pipes may also be inserted through bends in existing pipelines provided that these are not tighter than the specified minimum bending radius. It is also possible to rehabilitate individual sections of high-pressure gas pipelines, such as river crossings. Along straight pipelines, the maximum insertion length for aramid-reinforced plastic pipes is several hundred metres. On sections with a large number of bends, the maximum insertion length is reduced by the friction between the liner being inserted and the existing pipeline. In the case of major rehabilitation projects, the pipeline must therefore be divided into individual insertion sections and the liners inserted must then be tied-in to each other. For this purpose, the pipeline must be cut at its ends and at the ends of the insertion sections. When the individual liners have been inserted, they must be joined using the jointing techniques described above. This method was also used on the pilot sour gas pipeline project mentioned above.

Safety

When designing plastic structures to withstand admissible loads, not only the long-term strength but also the effects of working temperature, the fluid carried and loads as well as any applicable special factors must be taken into consideration. The rated strength F_N is calculated on the basis of the short-term rupture strength F_{Gr} (e.g. determined by a burst test for pipes) by the following equation:

$F_N = F_{Gr} \cdot (a_m \cdot a_T \cdot a_t \cdot a_P) / (S_m \cdot S_T \cdot S_t \cdot S_W \cdot S_P)$.

The following derating factors a_i are used:

a_m = fluid,

a_T = temperature,

a_t = time,

a_P = load.

These derating factors are ≤ 1 and indicate the extent to which the strength of the pipe material is reduced by the effects concerned.

The safety factors S_i used refer to:

S_m = fluid,

S_T = temperature,

S_t = time,

S_W = material,

S_P = load.

They define the safety margins to be taken into account in view of the scatter of the parameters concerned. Individual derating and safety factors may either be taken from publications or determined by tests. Provided that the fluid carried does not have a severe detrimental effect, the short-term strength F_{Gr} of aramid-reinforced plastic pipes designed for a service life of 50 years and a temperature difference of 40 K is about four times higher than the rated strength F_N. This does not mean that the pipe has a safety factor of four but only that the safe strength of the pipe at the end of the design service life taking into account realistic temperature conditions is about a quarter of its short-term strength at normal room temperature. A long-term strength graph for aramid fibres is shown in **Figure 5**.

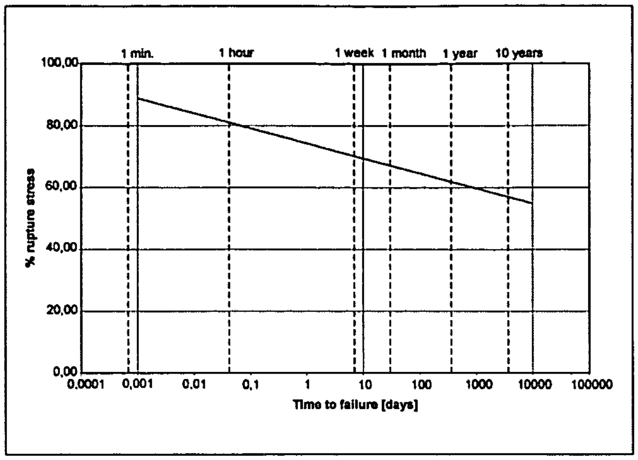

Fig. 5: Long-Term Strength Behaviour of Aramid

Product Introduction

Aramid-reinforced plastic pipes have not yet been generally approved for use in gas systems in Germany. However, on the basis of the studies and pilot projects mentioned above, the gas transmission companies have decided to apply for general approval of this pipeline material in cooperation with a pipe manufacturer and in liaison with the competent regulatory authorities.

Before aramid-reinforced plastic pipes can be used on a large scale in gas systems, not only economics but also technical aspects must be considered on the basis of measurements and tests. In addition to conducting material tests, it will be necessary to investigate the stress resulting from pipelaying and system operation. A specification for the new products must be developed in cooperation between all the parties concerned and it will be necessary for the pipe manufacturer to carry out basic research.

Before the pipes can be introduced on a large scale, the following aspects will need to be investigated:

- ▷ design criteria,
- ▷ long-term strength behaviour of pipes and pipelines including couplers,
- ▷ environmental compatibility,
- ▷ gas permeation,
- ▷ overall safety compared with steel pipes,
- ▷ requirements of applicable codes and standards.

In order to ensure the thorough investigation of all these aspects, which will be necessary before new materials can be generally approved for use in gas systems, targeted cooperation between pipe manufacturers and the gas industry will be essential. Only cooperation of this type can ensure the development of solutions which are economically viable in the changing conditions for gas supply to customers, laying the foundations for future-oriented gas supplies.

The Outlook

Aramid-reinforced plastic pipes have the potential to replace steel pipes in gas systems, at least to a certain extent in certain diameter ranges. Pipes can be delivered to site in coils. In view of the limitations on the drum radius, the pipe diameter should not exceed 200 mm in order to keep the load within the maximum height of 4 m allowed for road haulage. Under these conditions an aramid-reinforced plastic pipe with a diameter of 150 mm and a length of 280 m could be delivered to site in one coil. Depending on the soil conditions on site, this pipe could then be laid inexpensively in one length using ploughs or wheel ditchers, a method which is widely used in gas distribution systems. With the equipment currently available, it would even be possible to increase the depth of cover at relatively low additional cost, where this is required for safety reasons.

In this example, a pipe joint would only be required every 280 m along the pipeli-

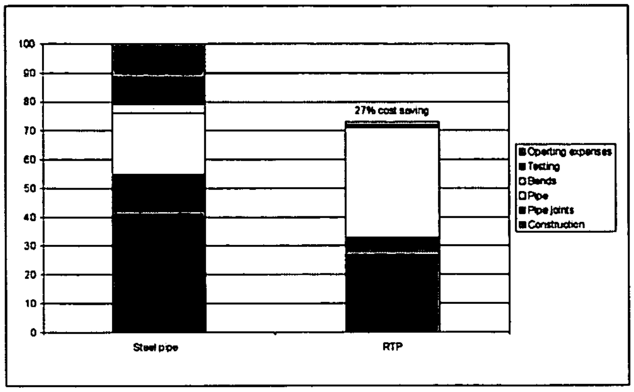

Fig. 6: Cost Comparison Aramid-Reinforced Plastic Pipeline/Steel Pipeline

ne route. In contrast, joints are needed every 12 to 18 m along a steel pipeline. The pipes must be strung out along the pipeline route individually and then welded together. The welded pipe string must be laid in an adequately sized trench, which must then be backfilled. Because of the work involved in stringing and lowering-in a welded steel pipeline, the working width required for a steel pipeline is considerably wider than for an aramid-reinforced plastic pipeline.

An initial cost estimate indicates that the cost of an aramid-reinforced plastic pipeline may be about 30 % lower than that of a steel pipeline. This figure refers to a pipeline with a diameter of 150 mm and a length of approx. 4 km. The cost comparison shown in **Figure 6** indicates that the cost of pipeline materials is higher for the aramid-reinforced plastic pipeline. This effect is to a certain extent offset by the fact that no bends are needed for the plastic pipeline. However, the main saving is due to the significantly lower cost of pipeline construction. As a cathodic protection system is not needed, the operating expenses of the plastic pipeline are also reduced.

Apart from these clear costs savings, it will be possible to construct a plastic pipeline in a shorter time than a steel pipeline. This reduction in the duration of construction in combination with the smaller working width needed should make it easier to obtain permits for the construction of plastic pipelines as the impact on nature and the environment will be more limited.

In view of the expected benefits of plastic pipeline systems development projects with following objectives have been started:

- ▷ to collect experience with aramid-reinforced plastic pipes, with respect to the pipe material, coupling systems and construction methods;
- ▷ to make aramid-reinforced plastic pipes available for gas transmission systems in Germany;
- ▷ to obtain approval for the construction of a first transmission pipeline using aramid-reinforced plastic pipes.

The following development work must be successfully completed before it will be possible to obtain approval for the construction of a transmission pipeline:

- ▷ investigation of the fitness of aramid-reinforced plastic pipes for long-term gas transmission service,
- ▷ investigation of the possibilities of reducing gas permeation and
- ▷ investigation of the strength and long-term resilience properties of coupling systems.

If these investigations are completed satisfactorily, it should be possible to convince inspection agencies and the authorities that aramid-reinforced plastic pipes can be used safely and reliably in the German gas industry.

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